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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/750,158 | 12/31/2003 | Nick Lindert | 421P17293 | 7905 |

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EXAMINER

DANG, PHUC T

ART UNIT PAPER NUMBER

2818

DATE MAILED: 01/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/750,158

Applicant(s)

LINDERT ET AL.

Examiner

PHUC T DANG

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 December 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 8, 16, 21, 26 and 27 is/are rejected.
- 7) ☒ Claim(s) 5, 7, 9-15, 17-20, 22-25 and 28-30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 020504.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Oath/Declaration

1. The oath/declaration filed on December 31, 2003 is acceptable.

Information Disclosure Statement

2. The office acknowledges receipt of the following items from the applicant:

Information Disclosure Statement (IDS) filed on February 5, 2004.

Specification

3. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

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4. Claims 1, 3, 8 and 21 are rejected under 35 U.S.C. 102 (b) as being anticipated by Yu et al., hereinafter "Yu" (U.S. Patent No. 6,495,402 B1).

Regarding claims 1, 3, 8 and 21, Yu discloses a method comprising:

providing a substrate having a source/drain region (24 and 26, Fig. 3a), a gate electrode (34, Fig. 3a) disposed above the substrate, and a channel region (28, Fig. 3a) formed below the gate electrode;

etching the source/drain region to form a faceted region near the channel region (Fig. 3b);

layering the faceted region with silicon germanium (42, Fig. 3c), and

depositing silicon (44, Fig. 3c) above the silicon germanium (42, Fig. 3c).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2, 4, 6 and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu in view of Weon et al., hereinafter "Weon" (U.S. Patent No. 6,599,803 B2).

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Regarding claim 2, the photoresist layer is deposited above the source/drain regions is considered to be well known in the art. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teaching of Yu with the photoresist for a purpose of improving the process.

Regarding claim 4, Yu discloses all the features of the claimed invention as discussed above, but does not disclose a step of etching further comprises anisotropic wet etching to form the faceted region.

Weon, however, discloses a step of etching further comprises anisotropic wet etching to form the faceted region [col. 3, lines 29-49].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the teaching of Weon to Yu discussed above such that a step of etching further comprises anisotropic wet etching to form the faceted region for a purpose of reducing the contact resistance between the silicon substrate and the silicon germanium.

Regarding claims 6 and 26-27, Yu discloses all the features of the claimed invention as discussed above, but does not disclose a step of forming the silicon germanium layer comprises epitaxially growing silicon germanium which comprises a germanium composition of about 10 percent to about 60 percent.

Weon, however, discloses a step of forming the silicon germanium layer comprises epitaxially growing silicon germanium which comprises a germanium composition of about 10 percent to about 60 percent [col. 3, lines 24-28].

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the teaching of Weon to Yu discussed above such that a step of forming the silicon germanium layer comprises epitaxially growing silicon germanium which comprises a germanium composition of about 10 percent to about 60 percent for a purpose of reducing the contact resistance between the silicon substrate and the silicon germanium.

Allowable Subject Matter

6. The following is a statement of reason for the indication of allowable subject matter:

Claims 5, 7, 9-20, 22-25 and 28-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

None of Prior Art made of records does not disclose the anisotropic wet etching allows for controlled faceting of the source/drain regions based on a crystal density and a crystal orientation of the source/drain regions as cited in claim 5 and the faceted regions have an etch-out angle of about 120 degrees to about 130 degrees as cited in claim 7 and the wet etching further comprises using an etch solution having about 2 percent to about 30 percent ammonium hydroxide by volume as cited in claims 9 and 23 and the wet etching further comprises using an etch solution of about 10 percent to about 30 percent tetra methyl ammonium hydroxide by volume as cited in claims 12 and 22 and the wet etching further comprises etching the source/drain region to an etch depth of about 100 Angstroms to about 500 Angstroms as cited in claims 14 and 24 and a step further comprises the facet region having an etch-out angle of about 120 degrees to about 130 degrees as cited in claims 15 and 30 and the etch solution is based on a crystal density

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and a crystal orientation of the substrate as cited in claim 18 and the wet etching further comprises sonicating the wet etch solution as cited in claim 19 and the layering invokes a strain on the silicon deposited above the silicon germanium as cited in claim 28 and on the channel region as cited in claim 29.

Claims 10-11, 13, 17, and 25 are depend directly or indirectly on claims 9, 12 and 24, then, they also would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuc T. Dang whose telephone number is (571) 272-1776. The examiner can normally be reached on 8:00 am-5:00 pm.

8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and After Final communications.

9. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Phuc T. Dang

P D



Primary Examiner

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